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(54) ROTARY PRINTING MACHINE

(71) We, SAUERESSIG GMBH, a body corporate organised under the Laws of Germany, of 4421 Wullen/Ahaus, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a rotary printing machine for printing on webs of material, particularly on webs of paper, plastics material or metal foil.

Rotary printing machines which have a number of superimposed printing cylinders driven by means of a common drive, are used in particular for printing multi-colour patterns on webs of material moving through the machine, each of the cylinders printing in succession a different colour or different design on the web of material as the latter passes through.

In previously proposed rotary multi-colour printing machines it has, however, been found to be a disadvantage that the speed of passage of the webs of material which are to be printed is limited, that the colours do not dry sufficiently quickly on the web of material between the successive cylinders, or that when quick-drying inks are used these dry on the printing cylinder, that a vertical pattern repeat can be adjusted only with difficulty, and that colour changes can be made only in an uneconomical manner and with long standstill times.

In contrast thereto the invention seeks to provide a rotary multicolour printing machine in which abovementioned disadvantages are reduced or eliminated which permits the use of quick-drying inks, in which the drying of inks between the sets of cylinders is possible, which is of simple construction and can be handled simply, rapidly, and dependably, in which the web of material can pass through at high speed,

[Price 33p]

which may be adapted to permit simple adjustment of a vertical pattern repeat, and which can be used for relief printing and for gravure printing.

According to the invention there is provided a rotary multicolour printing machine for printing on a moving web of material, wherein the machine comprises two or more superimposed printing cylinders arranged to be driven by a common drive means, and wherein between two successive printing cylinders, there is provided a diversion tube for guiding the web of material outside a plane containing the axes of the superimposed printing cylinders, the or each diversion tube having a porous wall through which compressed air can be passed to form a cushion of compressed air between the web of material and the surface of the tube. The web of material can thus be guided around the diversion tube without friction and the compressed air simultaneously dries the inks applied to the web of material.

In order to accelerate the drying of the inks, air can in addition be blown from drying nozzles onto the webs of material diverted out of the printing plane, and the web of material can be brought back into the printing plane by auxiliary deflecting means, such as a roller disposed in that plane in order to pass the web to the next printing cylinder.

It is advantageous for the impression cylinders to be separately driven, and both the printing cylinders and the impression cylinders can be driven by means of compressed air motors, so that the expensive explosion-proofing of the drive motors is not required.

In order to permit the use of quick-drying inks, the printing cylinders may be gravure cylinders arranged to rotate directly inside ink ducts, the ink taken up being distributed by ink ductor rollers lying at the side of the printing cylinders which may be wiped by

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doctor blades located at the tops of the impression cylinders near the highest points of the peripheries of the latter.

5 If the printing machine is to be used as a relief printing machine, the doctor blades are obviously not used and the ink is applied by the ink ductor rollers to the relief printing cylinders.

10 In order to ensure that the distance between the doctor blade and the printing line is kept short, the line of contact with the impression cylinder or with a smaller auxiliary impression cylinder is located near the highest point of the periphery of the cylinder. The plane through the axes of 15 the associated printing cylinder and impression cylinder therefore rises steeply at an acute angle to the horizontal.

20 For the purpose of adjusting the vertical pattern repeat, it has in addition been found advantageous to make the diversion tube adjustable at both ends in respect of its distance from the plane containing the axes of the printing cylinders.

25 In order to permit easy cleaning of the ink units and to facilitate colour change, the ink ducts, ink ductor rollers and doctor blades are preferably grouped together in a gate which can be swung up, each ink ducts first being lowered in order to pass 30 beneath the associated printing cylinder when the gate is swung up.

35 In order to enable the invention to be more readily understood reference will now be made to the accompanying drawings which illustrate diagrammatically and by way of example an embodiment thereof and in which:—

40 Figure 1 is a vertical section through a rotary gravure multicolour printing machine,

45 Figure 2 is a horizontal plan view of a gravure cylinder of the machine shown in Figure 1 at the level of diversion tubes, and

Figure 3 is a view of the printing machine with a gate open.

Referring now to the drawings, there is shown a printing machine through which a 50 web of material passes from top to bottom. Gravure cylinders 2 are mounted one above the other, at certain distances apart, on a frame 1 and are rotationally driven in conventional manner by means of a common 55 drive 11. The ink to be printed on the web of material is contained in ink ducts or trays 5, into which the gravure cylinders 2 dip. Ink ductor rollers 4 are arranged at the sides of the gravure cylinders 2 for 60 distributing the ink on the surface of the gravure cylinders, and downstream, in the direction of rotation of the cylinders 2, doctor blades 3 are disposed near the highest point of the periphery of the cylinders, these blades serving to wipe off excess 65

ink. Downstream of the highest point of the gravure cylinders 2, in the direction of rotation, is located the point of contact with the impression cylinders 6 or with auxiliary impression cylinders 7 disposed there- 70 between. As can be seen, the path between the doctor blade and the printing line, that is to say the line along which the impression cylinder acts on the gravure cylinder, is extremely short. The axes of the impres- 75 sion cylinders and the gravure cylinders therefore do not lie in the horizontal plane, as is customary, but the plane through the centres rises at an acute angle to the horizontal. 80

After passing through the printing line, the web of material is diverted from the printing plane by a diversion tube 8, which has a porous wall through which compressed air passes out of the interior of the 85 tube. An air cushion is formed between the web of material and the surface of the diversion tube 8, so that the web of material is guided without friction around the tube. Furthermore, the compressed air 90 serves to dry the ink which has been applied, so that when the material passes to the next gravure cylinder it is completely dry. The drying effect can be intensified by additional drying nozzles disposed upstream 95 and/or downstream of the or each diversion tube; the drive 11 for the gravure cylinders and a drive 12 for the impression cylinders can be operated with compressed air from the source supplying compressed air to the 100 diversion tube 8 and the drying nozzles. In order to bring the web of material back to the correct position for passing to the next gravure cylinder, a deflecting roller 9 is provided in the printing plane. 105

The ink ducts 5 are arranged in a gate 13 which is pivoted on the frame 1 and also holds the ink ductor rollers 4 and the doctor blades 3. The ink ducts 5 can be 110 lowered in relation to the gate 13, so that when the gate 13 is swung out to the position shown in Figure 3, their inner edge is clear of the lowest point of the cylinders 2. The ink ducts can be lowered by means of a linkage (not shown) acting simulta- 115 neously on all the ink ducts; it is however also possible for each individual ink duct to be lowered individually.

The diversion tube 8 is adjustable in the horizontal direction in the frame 1, and, 120 by adjusting the distance between the diversion tube and the plane containing the axes of the printing cylinders, it is possible to adjust the vertical pattern repeat for the web of material. Since the tube is adjusted 125 independently at its two mounting points, adjustment of the vertical pattern repeat is also possible at one side only. In order to enable the air to pass uniformly out of the diversion tube 8, the latter is advanta- 130

geously made of porous sintered material; the compressed air supplied to the tube has, for example, a gauge pressure of between 0.5 and 5 atmospheres.

- 5 In addition devices may be provided on the doctor blades 3 to enable them to be adjusted in relation to the gravure cylinder. If the present rotary multicolour printing machine works as a relief printing machine, 10 the doctor blade can be removed and the ink is then applied by means of the ink ductor roller 4.

WHAT WE CLAIM IS:—

1. A rotary multicolour printing machine 15 for printing on a moving web of material, wherein the machine comprises two or more superimposed printing cylinders arranged to be driven by a common drive means, and wherein, between two successive printing 20 cylinders, there is provided a diversion tube for guiding the web of material outside a plane containing the axes of the superimposed printing cylinders, having a porous wall through which compressed air can be 25 passed to form a cushion of compressed air between the surface of the tube and the web of material when present.

2. A printing machine as claimed in Claim 1, wherein auxiliary deflecting means 30 for returning the web of material to the printing plane are provided downstream of the or each of the diversion tubes in intended direction of travel of the web.

3. A printing machine as claimed in 35 Claim 1 or 2, wherein the line of contact between a printing cylinder and an impression cylinder or an auxiliary impression cylinder lies near the highest point of the periphery of the printing cylinder, and a 40 plane through the axes of the printing cylinder and impression cylinder(s) rises at an acute angle to the horizontal.

4. A printing machine as claimed in 45 Claim 3 wherein the impression cylinders are driven uniformly and separately from the printing cylinders and both the impression cylinders and the printing cylinders are driven by compressed air motors.

5. A printing machine as claimed in any one of Claims 1 to 4, wherein the or each 50 diversion means is adjustable at both its ends, in respect of its distance from the plane containing the axes of the printing cylinders, so as to permit simple adjustment of the vertical pattern repeat. 55

6. A printing machine as claimed in any one of Claims 1 to 5, wherein the printing cylinders are gravure cylinders and are arranged to rotate directly inside ink ducts, an ink-ductor roller being disposed at the 60 side of each gravure cylinder, and wherein a doctor blade for wiping off the excess ink is located near the highest point of the periphery of each gravure cylinder.

7. A printing machine as claimed in 65 Claim 6, wherein the ink ducts are adapted to be lowered and the ink ducts, the ink ductor rollers, and the doctor blades are mounted together on a gate, which is hingedly attached to a machine frame and 70 which is adapted to be swung out of its working position after the ducts have been lowered in order to pass beneath the printing cylinders when the gate is swung out of its working position. 75

8. A printing machine as claimed in any one of Claims 1 to 7, wherein drying nozzles for drying the web of material are disposed upstream and/or downstream of the or each 80 diversion tube in the intended direction of travel of the web of material.

9. A rotary multicolour gravure printing machine substantially as hereinbefore described with reference to the accompanying 85 drawings.

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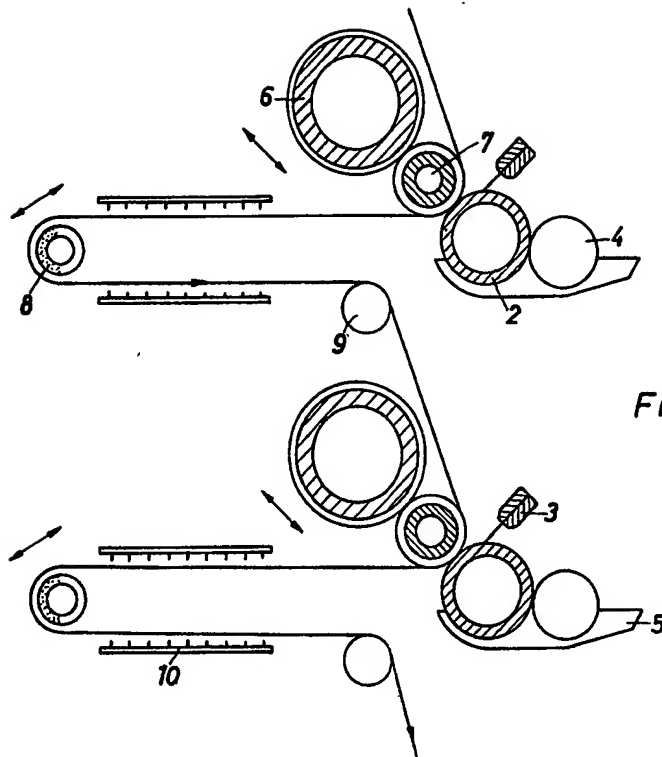
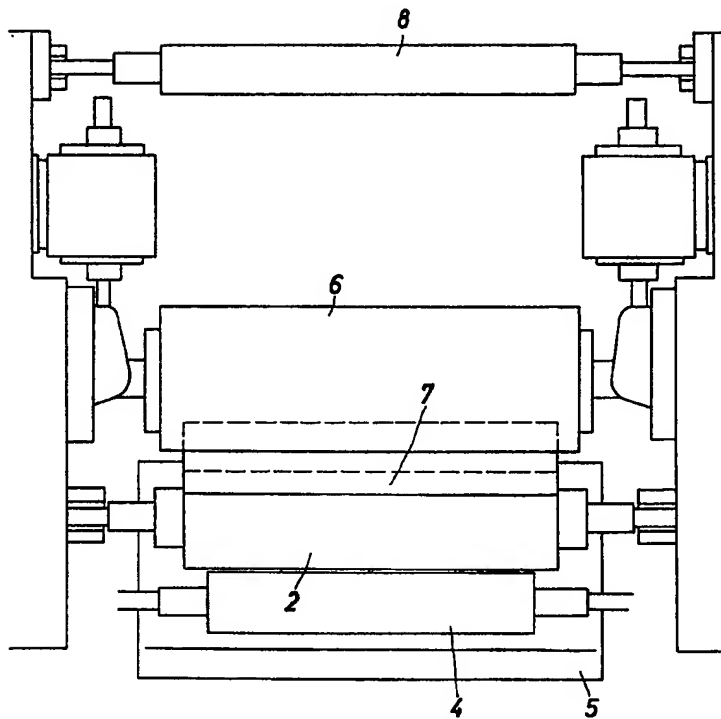
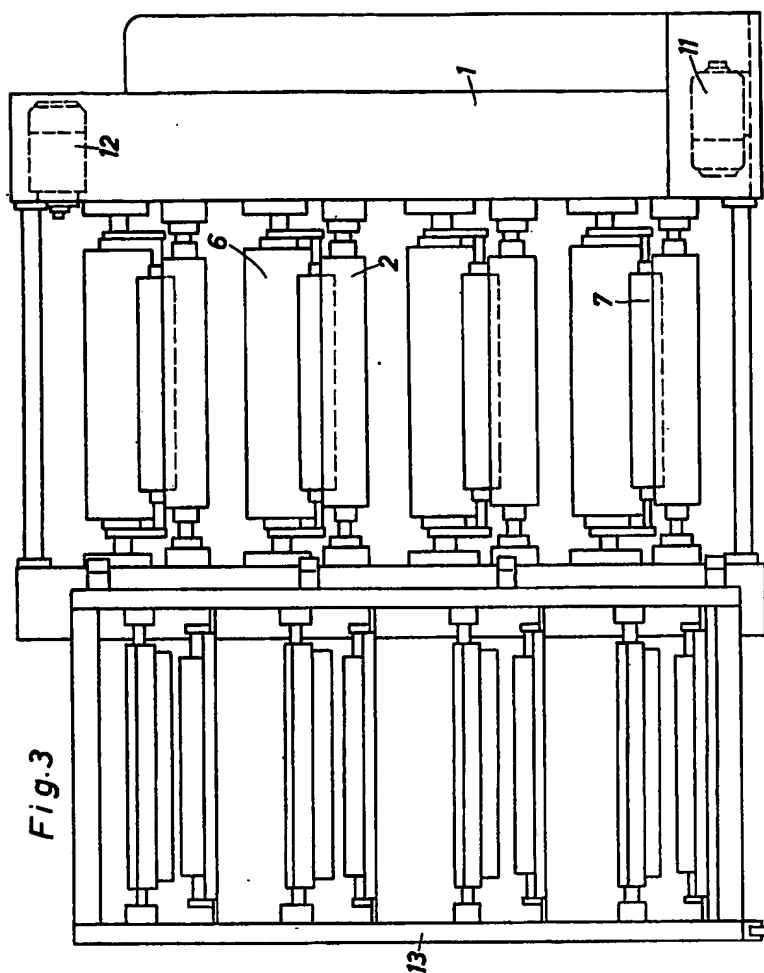


Fig.1

Fig.2





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